Preregistration

My preregistration for the study Testing sampling-based models of probability estimations with an event ranking task

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Study Information

Testing sampling-based models of probability estimations with an event ranking task	My preregistration for the study Testing sampling-based models of probability estimations with an event ranking task
	People's probability judgments often appear to be probabilistically incoherent. The most prominent example of this is the conjunction fallacy (Kahneman & Tversky, 1983). Recently, a sampling-based model, the Probability Theory plus Noise (PT+N) model (Costello & Watts, 2014; Howe & Costello, 2020), has been proposed to account for biased probability judgments. PT+N model of probability estimations assumes that people generate samples according to the probabilities in their mind and then work with the samples to arrive at an explicit judgement. According to PT+N

model, biases in probability judgements like conjunction fallacy arise from sampling error and memory bias instead of inconsistent inherent beliefs. One limitation with testing this model is that it has only been investigated in the probability estimation tasks. In the current study, a ranking task is used to study people's probability judgments, and more importantly, to test the PT+N model. In the ranking task, participants are asked to provide a ranking for the event set consisting of four events, A, not-A, B, and not-B, in terms of their subjective probabilities.

Hypotheses We formally derive the predictions for rankings from the PT+N model.Our predictions suggest that (1) people will sometimes violate the complement rule by providing logically impossible rankings, and (2) specific qualitative patterns should appear in rankings.

Design Plan

From the PT+N rank model, the distribution of rankings over events depends on (1) subjective probabilities of events, (2) sample size one uses when making a probability judgement, and (3) noise in the sampling process. In the first study, we aim to manipulate the subjective probabilities within subjects and to see if the observed responses follow the qualitative predictions made by PT+N model.

Study type **Experiment**. A researcher randomly assigns treatments to study subjects, this includes field or lab experiments. This is also known as an intervention experiment and includes randomized controlled trials.

Blinding No blinding is involved in this study.

Study design In the current study, we will present participants in total 12 events consisting of 2 pairs of complementary events, A, not-A, B and not-B. Participants will be asked to provide an ranking for each of the 12 event set.

We have a within-subject design with 1 factor (i.e., type of events) which has three levels. Every participant will be presented with three types of events. We will present each participants four event sets that consisting of edge events that are near

	the ends of the probability scale only (i.e., {A = 0.1, not-A = 0.9, B = 0.2, not-B = 0.8}), four event sets consisting of middle events that are near the middle of the probability scale (i.e., {A = 0.5, not-A = 0.5, B = 0.4, not-B = 0.6}), and four events sets consisting of one pair of middle events and one pair of edge events (i.e., {A = 0.1, not-A = 0.9, B = 0.5, not-B = 0.5}).
Randomization	Different types of events are not blocked from each other. The order of 12 event sets that will be presented is completely randomized across all participants.

Sampling Plan

We will use Prolific (https://www.prolific.co) to recruit 150 German sample.

Existing data	**Registration prior to creation of data**. As of the date of submission of this research plan for preregistration, the data have not yet been collected, created, or realized.
Explanation of existing data	Enter your response here.
Data collection procedures	Participants will be recruited using Prolific (https://www.prolific.co). Participants will be paid £2 for their participation. Participants must be at least 18 years old and be able to eat the ingredients of the pastries. Participant must current live in Germany and has German as their first language.
Sample size	Our target sample size is 150 participants.
Sample size rationale	Enter your response here.
Stopping rule	Enter your response here.

Variables

Manipulated variables	We manipulated the type of events that participant will see. The three levels of this categorical variable are: only middle events, only edge events, and middle plus edge events.
Measured variables	We can enumerate all possible responses that participants can provide in the ranking task. There are in total 79 possible ....
Indices	Enter your response here.

Analysis Plan

We will analyse the data using a newly developed multinomial processing tree (MPT) model. We will fit the MPT model for each within-subject condition using two different hierarchical-Bayesian approaches (Klauer, 2010 &), namely the beta-MPT approach (Smith & Batchelder, 2010) and the latent-trait approach (Klauer, 2010). The model fitting will be implemented via TreeBUGS Package (Heck, Arnold, & Arnold, 2018). The TreeBUGS package yields Markov-Chain Monte-Carlo (MCMC) samples from the posterior probability distribution of the mean of the MPT parameters.

We are interested in the posterior distribution of the difference in (l and t1) parameters. We will compute the means and the 95% credibility interval of these differences to assess the effect of event types on the MPT parameters.

Statistical models	Figure 1 shows the tree representation of our MPT model.
Transformations	Enter your response here.
Inference criteria	

Data exclusion	We will include an attention check item to determine eligibility for inclusion.
Missing data	Enter your response here.
Exploratory analyses (optional)	Enter your response here.

Other

Other (Optional)	Enter your response here.

References